

Twenty-Second Transit Construction Roundtable
Newark, New Jersey
May 2-4, 2004

Minutes of the Meeting

Monday, May 3

Welcome and Introduction

Sam Carnaggio, Director of the Federal Transit Administration (FTA)'s Office of Engineering, opened the Twenty-Second Transit Construction Roundtable by welcoming all the attendees and introducing Anthony Carr, FTA's Deputy Regional Administrator (Region 2). Mr. Carr welcomed attendees on behalf of Region 2 and thanked New Jersey Transit (NJ Transit) for hosting this Roundtable. He then introduced George Warrington, Executive Director of NJ Transit, who thanked FTA for this opportunity to assemble people with a wealth of experience around the table to exchange information, learn from each other, and challenge each other to improve.

Mr. Warrington described the challenge of developing a process by which to capture the needs and requirements of system users. He cautioned agencies to avoid becoming insular; by doing so, they risk losing the critical details that define user needs. Mr. Warrington encouraged agencies to take this opportunity to share their mistakes and their successes, that other projects might learn and avoid similar pitfalls in the future.

He went on to state that he is very proud of NJ Transit's accomplishments and has instructed NJ Transit staff in attendance at the Roundtable to share their experiences and influences in changing environments. He emphasized that all agencies are building in a real world for real world users, and that their projects must be designed with reality in mind. He is glad FTA has created a forum for these agencies to share their unique challenges and solutions, and encouraged participants to fully engage in the process for the benefit of their projects.

Following Mr. Warrington's remarks, Mr. Carnaggio recognized P. Takis Salpeas of Washington Metro Area Transit Authority (WMATA) and Mysore Nagaraja of New York Metropolitan Transit Authority (MTA) as the longest standing members of the Construction Roundtable, having attended all twenty-two Roundtables. He also informed the group that PATH offered an additional construction tour of the AirTrain to John F. Kennedy (JFK) Airport after the scheduled tour of the Hudson-Bergen Line. Finally, he encouraged new attendees to take advantage of the forum to network with their peers and develop resources to take away from the Roundtable.

Mr. Carnaggio's remarks concluded the Welcome and Introductions.

Around-the-Table Discussion

Mr. Carnaggio then began the Around-the-Table discussion, which gives the Roundtable participants the opportunity to introduce themselves and their agencies to the group and talk briefly about their most pressing concerns and challenges. This discussion creates the opportunity for agencies to identify those facing similar issues or that have taken steps to solve similar problems.

Steve Knobbe, Metro (formerly Bi-State) Saint Louis, said the agency's 100 percent locally funded Cross-County Metro Link light rail project is now in construction. He said that the biggest challenge facing Metro now is the cost of steel. Prices are on the rise and the Association of General Contractors is lobbying for relief; they have proposed two methods. Mr. Knobbe would like to know if anyone has had similar problems and has considered offering relief on steel prices. If so, what specifications are being used to determine the level of relief?

Frank Ward, Charlotte Area Transit System (CATS), told the group that CATS is starting to advertise for bids, which are anticipated to come in between June and December of this year. The project is divided into ten packages and the agency is bidding them individually. This project is a New Start and is looking for advice and secure funding from FTA.

Don Carnell, Triangle Transit Authority, shared that his agency's single biggest concern now is risk assessment. This new element of the FTA evaluation process is creating challenges for the project. One of the Authority's recent projects was categorized as a meritorious project in the President's budget, but is having difficulty getting a Fully Funded Grant Agreement (FFGA) from FTA because of the risk assessment requirement. Risk is just one element of scrutiny; the agency must consider budget and schedule with equal attention. Mr. Carnell said that Triangle Transit is realizing that any increases in cost impact overall cost effectiveness. If costs rise dramatically, the project can exceed the \$25 threshold, creating a whole new level of mitigation discussions. In the meantime, the Authority is working with FTA to obtain its FFGA and has been having a good experience so far, but could use direction on how to manage risk.

Les Durant, Hampton Roads Transit, is working on two projects: one on the peninsula (currently in the final stages of environmental impact analysis) and one in Norfolk (currently in the preliminary engineering process). His agency is most concerned about the user benefit number; the project is barely meeting the recommended threshold and as a result has a not-recommendation rating. Mr. Durant asked the FTA to reconsider some of the impact this user benefit has on projects, because it is putting enormous pressure to reduce costs on agencies. In his experience this only results in higher long-term operating and maintenance costs. The agency is ready to build, but needs approval.

George Stanley, Southeastern Pennsylvania Transportation Authority, is very concerned with the rising cost of steel. The agency's contractors are asking for relief. The costs impact not only construction but also operations throughout the Authority, and they are taking a hard line with their contractors in an attempt to reduce impact.

Wulf Grote, Valley Metro, is developing a 20-mile light rail project that recently switched from ballasted to embedded track due to local politics. The project had received a Letter of No Prejudice from FTA to buy track and now, with the switch, there is a debate about what kind of rail to use: t-rail or girder rail. Mr. Grote is looking for advice from the Roundtable members on this issue. He also mentioned that he'd heard a rumor that girder rail is unaffected by the steel price increases and would like to know if there's any truth to that rumor. The agency is now engaged in risk assessment for the project, and he is interested in the outcome of the analysis.

Henry Nutbrown, Port Authority of Allegheny County, described his agency's recent project to construct eleven platform stations. The platforms originally had 3-inch thick expendable wearing cores on sub-slab stations, but experienced extensive cracking. Making the cores 4-inches thick didn't resolve the cracking problem, and there is now map cracking as well. Mr. Nutbrown is surprised that in this day and age we can't avoid problems with cracked concrete. The agency asked a professor from Pennsylvania State University to analyze the problem. He advised the group that if they're topping any existing concrete, use closer joint spacing to prevent top-slab cracking.

Jim Van Epps, Bay Area Rapid Transit (BART), told the group that BART is currently working on four projects: a new connection to the Oakland airport, an East Bay extension to San Jose, seismic retrofit of the BART system, and the BART-to-airport project closeout. In a complex design-build project, he said, the closeout process can be a nightmare for the lead contractor because the as-builts and deliverables (and much more) have to roll-up from the sub-contractors. BART withheld about \$21 million to manage the closeout to cover liquidated damages, but the trickle-down effect of withholding this money has had a significant effect on some of the lower tier subcontractors. BART would advise putting careful thought into the effects of withholding money when writing large design-build contracts.

Ken Kersey, Tri-Met (Oregon), recently opened the Expo Line light rail. He shared one of the major concerns on the line: platform construction. The platforms are cleaned with a pressure washer and the pressure blasted the sand out of the grooves on their sand-set pavers. Instead of getting clean, there is sand everywhere; the issue has become a major maintenance concern. The agency has also just received approval of the final design on a 15-mile commuter rail project, and plans to move into PE on two light rail segments (extensions that tie into the existing line).

Mike Schipper, Greater Cleveland Regional Transit Authority, said the agency's Euclid Corridor BRT project is still its major focus; they are working on submitting their FFGA proposal. The project has recently completed the risk assessment process and Mr.

Schipper stated that he is now a big risk assessment advocate, through he believes it should be included earlier in the development process. He also thinks utility agreements and real estate issues need to move faster. The bidding process has, he believes, reached bottom in Cleveland, thanks to a terrible economy—contractors have been bidding very aggressively. The increases in steel prices have had some impact on bids, but the agency is not offering relief to contractors.

Dave Conover, Sacramento Regional Transit District, informed the group that the Amtrak/Folsom project was progressing well with an intermediate opening to the Sunrise Station in the City of Rancho Cordova this June 11th. Construction is continuing into the City of Folsom with a planned opening in April 2005. The Amtrak extension is nearing design completion and will go out to bid mid May. Mr. Conover is seeing an increase in contractors who want to use the measured mile approach when determining project impacts. He would like to hear from any agencies that have some experience with this approach and can discuss the pros and cons.

Mysore Nagaraja, New York MTA, informed the participants that the agency is in the final stages of EIS and design for many of the area's projects. The Lower Manhattan projects are very fast-paced (four-year completion deadline). The EIS is complete and the risk assessment is nearly complete. Mr. Nagaraja volunteered his experiences with security to anyone in the group who is interested.

Glenn Zika, Chicago Transit Authority (CTA), said that steel prices are a major concern. The agency has 12,000 tons of steel on order and he joked that he'll tell everyone how bad prices really will be when the shipment arrives. The agency agreed to let the contractor fabricate specific steel and store it on-site because he will lock-down a specific price. Contractors have been complaining that the steel mills won't guarantee a price and it's becoming a real problem. Another big challenge is the design of Block 37, an open block in the downtown area that will connect two subways and an airport express line. There are plans to add a high-rise on top of it. The developer will build the station but CTA has to connect into the old tunnels; ground subsidence is a challenge. Mr. Zika also told the group that the agency replaced the Harrison Curve (a handout was provided) in 80 hours over one weekend to increase a 10 mile-per-hour curve to 35 miles-per-hour. The increase saves 40 seconds and grew rush-hour capacity by five trains. The project was completed ahead of schedule and below budget.

P. Takis Salpeas, Washington Area Metro Transit Authority (WMATA), announced that the agency is opening, at the end of this year, the Blue Line extension in Maryland and the Red Line's in-fill station at New York Avenue. The Orange Line extension to Dulles Airport is proceeding as planned; approval of EIS is due in late 2004. This April, the agency also began site preparation for an expansion to the New Carrollton Rail Yard. WMATA's board recently approved \$22 million for engineering design services and construction contract development for three rail yard expansions, 57 traction power substation upgrades, and systems support to accommodate 8-car train operation. Mr. Salpeas updated the Roundtable about progress on WMATA's capital improvement program, and outlined several technology projects (including safety and security). He

also said that the agency is now developing D.C.'s first trolley line in Anacostia to support the area's waterfront initiative and to preserve right-of-way for future investment.

Joseph Gildner, Sound Transit/Link Light Rail, has three projects underway.

Construction has begun on the initial segment, and the agency is initiating PE on two other segments. Sound Transit recently got through a legal challenge to the objectivity of a best-value evaluation. Mr. Gildner also brought along copies of the agency's steel price escalation specs, which were compiled with assistance from FTA and other members of the Roundtable. He cited the completed specs as an example of the value of the Roundtable and encouraged new members to feel free to put out questions, as there is generally a property in attendance that has experience and insight into the issues. Another concern for the agency is the opening next week of underground construction bids for a tunnel project. The selected mining method demands international experience and, unfortunately, there is not much interest from international contractors. Of the 11 prospective bidders, only two actually submitted proposals. The international community is looking to China/Asia to expand their business. Staffing is also a bit of a problem; the agency needs qualified systems and civil engineering staff.

Archer Walters, Santa Clara Valley Transportation Agency (VTA), recently completed a capital light rail project ahead of schedule and under budget; the line will be starting revenue operations in June. VTA is currently in the PE phase of the planned extension of BART to San Jose. This is proving to be a very challenging project because the relationship between the two organizations can be tense. Mr. Walters would like to know if any agencies that have worked together to join two systems have any advice on inter-agency relationship management. Mr. Walters mentioned that he'd already received excellent advice at last night's reception on the planned purchase of tunnel boring equipment; the agency plans to supply the machinery to the contractor. He would appreciate additional advice on maintenance of that equipment and rate of excavation to make sure the machinery is not blamed for problems.

Connie Crawford, New York City MTA, mentioned that the prices of other metals are going down and that the trend may be reflected in the cost of steel soon. She said that MTA is currently very concerned about the "Buy America" clause, especially with respect to software and microcomputers. The agency is planning to fight the clause and Ms. Crawford welcomed any agencies that might wish to join forces to oppose these restrictions. MTA is launching a commission approach to project work; they test facilities in the last months of the project to make sure everything works as planned from the beginning. Because systems are taking over projects (in terms of resources and even space) and they are managed by subcontractors, MTA is formalizing the process and bringing it in-house. She would be happy to exchange ideas and experiences with anyone else doing this kind of work.

Paul Taylor, Orange County Transit Authority, is working on the Center Line light rail project to serve the most densely populated area in California outside San Francisco. Politics decreed that the line would use dual-power light rail vehicles, and certain stretches of the alignment cannot have OCS on top of the aerial guideway for aesthetic

purposes. Now the Authority is searching for a manufacturer to make a vehicle with dual-power capability, and Mr. Taylor would appreciate any insight into this dilemma.

Donald Preau, Regional Transit Authority – New Orleans, told the group that the \$160 million Canal Street project opened last month. The most innovative part of the project was the in-house assembly of 24 street cars modeled after the 1920 cars that run on the St. Charles line. Project closeout is Mr. Preau's major concern at this point, the primary issue being errors and omissions resolutions with the designer. He would appreciate help and insight into this issue.

Vanessa Young, Memphis Area Transit Authority, announced the opening of the Medical Center rail extension line, which added four miles to the system – a 50 percent increase. Maintenance is now the big issue; approximately 70 percent of the line is embedded track and shared right-of-way, and wheel maintenance is a problem. Ms. Young would like advice about the prequalification process for contractors, especially strategies to minimize contractor protests over prequalification requirements.

Fred Ohene, Regional Transportation Commission of Southern Nevada, said that the fixed guideway extension to downtown is the big focus for the agency now. He is now waiting for final design approval from FTA so the project can move into the FFGA submission process. Their Bus Rapid Transit Project, MAX is another project opening this year that encountered software issues, but that has been recently resolved. Steel price increases are a major concern because the Commission cannot compete on prices. Railroad right-of-way and positions are an area in which Mr. Ohene is searching for advice and insight from the Roundtable.

Mr. Carnaggio added that Las Vegas' Monorail is opening in July and is a fascinating project in terms of innovation and funding resources.

Tom DeMaria, MTA-Long Island Railroad, is working on system-wide expansion. The planned extension from Huntington to King's Park is approximately 50 percent through the EIS process. The agency is receiving bids now on a mainline third track project that will open up east side access to the major train terminals. A third extension is also in the EIS process. The agency is in the last year of a capital funding program and is filing for a five-year extension. With steel prices rising, Mr. DeMaria is concerned about how much funding will be allocated. Three big areas of focus for the agency now are systems, maintenance, and rail car procurement; the new M7 will eventually become the bulk of the fleet, and MTA is having an excellent experience with them. Mr. DeMaria would be happy to share insight and advice into these new vehicles.

Don Bullock, North San Diego County Transit Development Board, is working on a 22-mile light rail project using the first federally funded DMU vehicle. There have been some difficulties, especially in terms of regulatory approval (due to the newness of the vehicles), but the oversight committees have adjusted and rewritten the regulations. Hopefully, this process will open up opportunities for other agencies to use this type of vehicle. Now bidding is underway for mainline construction. Mr. Bullock observed that

the accountability for quality and timeliness is very difficult to assign to the designers, and he is dissatisfied with their performance. There is no central point of responsibility, and the situation has increased the level of owner oversight. The agency is trying to change the contracts to control the design team. He also told the group that the DMU vehicles are non-FRA compliant and cost approximately \$3 million per car. The biggest advantage is the high capacity of the vehicles, which will improve long-term efficiency.

Dan Mazza, South Florida Regional Transportation Authority, shared that the agency has successfully added an amendment to its FFGA and now has an additional year to make the ride date after reducing the project scope. Things are going very well on Mr. Mazza's 43-mile double-tracking project, which is opening incrementally. All of the design will be done by the end of the summer, which makes it easier to adhere to CSX Railroad's standards (the agency is bound to follow the railroad's standard even if bidding is already complete). Mr. Mazza also informed everyone that the General Accounting Office (GAO) has put out a report on rail and commuter rail issues and negotiations. It is very well researched and contains a lot of helpful information. The report is available online at www.gao.gov/cgi-bin/getrpt?GAO-04-240. GAO recommends the Surface Transportation Board become more involved in negotiations. Mr. Mazza recommends reading this report to anyone trying to work with the railroads.

Josh Sawislak, Virginia Department of Rail and Public Transportation, is working with WMATA to get approval to begin PE to extend Metro to Dulles airport. In phase one, the line will extend to Tyson's Corner, a densely populated suburban area. The agency is struggling to work with WMATA and maintain an effective working relationship. Construction in Tyson's Corner, an area that is totally auto-dependent, is going to be another huge challenge. Mr. Sawislak would be interested in hearing from anyone who has experience building under these conditions.

David Ryan, Massachusetts Bay Transportation Authority, told the group that the agency is currently in its tenth year of construction on the Silver Line, phase two, which is scheduled to open in the fall. Soon Mr. Ryan will request \$2.5 million from his Board for change orders on this project; of the three orders being submitted, two are related to errors and omissions. Ten percent seems to be the reasonable rate of recovery. Mr. Ryan would like to talk to anyone with experience on recovery for errors and omissions: when do you start recovery? The project was hurt by misinformation from the utility company, and is currently talking to an outside law firm to pursue claims against the company. MBTA also has a new tunnel project underway and would like to talk to anyone who has done a new start along this line within the last three years. Finally, Mr. Ryan told everyone that there might be hope for steel prices, because the Big Dig is concluding and the contractors are taking down the steel elevated structures to sell the steel to China for more than the bid.

Karen Scott, Transit Authority of River City, said that the agency is attempting to close the EIS work on its 17-mile light rail project, but is prevented from doing so by the issue of ridership numbers and user benefits. Funding is the most pressing issue now, especially in terms of local commitment. The project has been bumped from the ballot

repeatedly and may not even make it onto this November's ballot, so the agency is settling in for a much longer haul.

Del Walker, Colorado Department of Transportation, has been working on T-REX, which is now 60 percent complete. Mr. Walker had no problems to report; however, he mentioned that T-REX is not closing the project until 2006 but has started talking to the contractor about closeout early based on Mr. Van Epps advice and experience with BART.

Ronald Yutko, MTA Metro North Railroad, reminded the group that the line runs north and west of New York City to link with Connecticut and parts of Northern New Jersey. MTA Metro North shares resources with the rest of the MTA organization. Most projects fall into the \$10 million to \$50 million range. The organization is also receiving new M7 cars from Bombardier; the first train was installed two weeks ago, despite a difficult year with regard to rolling stock. The agency has been increasing the number of design-build projects and, though there have been some problems, overall they have been a success.

Richard Sarles, New Jersey Transit, said that during the past few months the agency has solved several major challenges. The River Line opened, and the Hudson-Bergen Line is now well underway. The Secaucus transfer station is becoming a reality, and the agency plans to build a commuter rail link to the Meadowlands sports complex, where a major commercial redevelopment is underway. The latter project also involves highway construction and connections. The agency has accepted the challenge but anticipates institutional hurdles along the way.

Jai Therattil, New York State Department of Transportation, works primarily on the bus and ferry transit side of DoT. The Department has recently purchased and is in the process of launching three new ferries, and plans to reconstruct two ferry terminals. This project is being completed in conjunction with MTA-New York City to coordinate the 1/9 station with ferry service. The projects are funded by a loan from FTA, which is keeping them moving at a fast pace. Steel prices are a major factor for project costs. Another issue is the rate of changes to project design from the operations staff, which is not necessarily aware of the latest technologies. The third issue facing the agency, Mr. Therattil said, is errors and omissions in design; it doesn't know at what point to begin recovery.

Steve Silva, Maryland Transit Administration, reminded the group that the Administration works with four modes of transportation: metro, light rail, bus, and commuter rail. The most challenging project is the light rail double tracking project, which is renovating eight segments of original single track alignment. The project has evolved over time due to a change in the state's political climate. The agency is always trying to maintain a balance between operations and ridership versus construction efficiency, and has several contractors working together to get the project done. Together, they decided to shut down the light rail for four to six months to do the work and the agency is now running bus shuttles—a challenge unto itself. Community issues

are the biggest challenge as the construction phase has begun. Procurement cost management is another problem; the agency isn't getting the inspections it needs at plants and is having trouble with materials. Mr. Silva would appreciate insight from anyone as to how to better management procurement contracts. Another challenge is quality and design controls and errors and omissions. Finally, Mr. Silva told the group that on some of the smaller contracts, the agency is employing brokers who seem to have more trouble controlling their subcontractors; Mr. Silva would like advice on how to get a higher percentage of work from prime contractors.

Ralph Jackson, Utah Transit Authority, recently opened the second extension to the light rail. With 38,000 riders a day, vehicle capacity is now the biggest problem facing the agency. It has purchased 28 vehicles to help offset the strain on the rolling stock, and they are being retrofitted to expand the fleet during peak periods. Mr. Jackson also told the group that UTA is in the final stages of design for an extension to the light rail connecting to the commuter rail line. Two other light rail corridors are in the PE/DEIS process; the city and the developers are paying half the cost of this process. UTA has purchased 185 miles of right-of-way from Union Pacific. In the sale, UTA negotiated an agreement setting the ground rules for running commuter rail adjacent to the freight operations, and is getting good cooperation from the railroad. The agency is using an unusual procurement process for the commuter rail project, in that the contractor (CMGC)'s project manager and the designer are collocated at UTA's facility. They are currently working together to establish a guaranteed maximum price to speed final design authorization and FFGA application. The project is moving quickly because UTA has negotiated an interlocal agreement with more than 40 communities to expedite the project. Funding is the biggest problem, but UTA is also struggling to resolve an American's with Disabilities Act (ADA) issue with the new vehicles and applying for a waiver to limit the requirement that disabled riders have access to every door of the vehicle.

William Prey, San Diego Association of Governments (SanDAG), said that six months ago a consolidation of agencies and services created SanDAG. Mr. Prey told the Roundtable that in the fall, the sales tax initiative is up for reauthorization (a one-half cent increase) to support transportation funding. The Mission Valley East trolley extension is 85 percent complete and on schedule to open in 2005. The Mid-Coast project is a six-mile extension the agency is working on now, and the biggest hurdle is figuring out the delivery method (design-build or alternative) and risk. Errors and omissions recovery is another issue about which Mr. Prey would like to have some advice. Mr. Prey also mentioned that the new Padres stadium is serviced by three transit stations that are currently carrying 28 percent of the gate on average, which is more than was expected. However, that has not affected service.

Henry Stoppolecamp, Regional Transportation District of Denver, reminded the group that T-REX is the only project currently under construction, but went on to say that several projects are now in the EIS phase. This November there will be a vote to increase the sales tax by four-tenths of a percent to fund new projects. Staffing is a real problem; the agency has given up on finding qualified individuals and is relying on contractors to

do the work. However, this isn't a solution—the agency needs a program management consultant to augment the team. If the group has worked with someone they would refer, Mr. Stoppolecamp would like to hear about him/her. He also said that the agency needs tier-2 compliant locomotive vehicles and would like any information the group can provide.

Tim McKay, Dallas Area Rapid Transit, said the Arena station is opening in November 2004. The agency also recently received the Record of Decision for the northwest-southeast corridor, a 21-mile double track project. The request for final design approval was delivered to FTA today. Ridership number, risk assessment, and U.S. flagship requirements (LRBs) represent the agency's biggest hurdles. The flagship requirements represent a \$700,000 cost increase. DART is working with the Maritime Commission and will keep the group apprised of the negotiations, but Mr. McKay warned that these requirements can represent a significant hit to a small budget.

Isabel Padron, Miami Dade Transit, is most concerned with errors and omissions. She would like to hear what kinds of recovery procedures other agencies have in place.

Ms. Padron's comments concluded the Around-the-Table portion of the agenda.

Introduction to the Construction Tour

Steven Santoro, Chief of New Light Rail Construction, NJ Transit, gave the group a comprehensive overview of the line's development and ongoing construction prior to embarking on the Hudson Bergen Light Rail construction tour.

Mr. Santoro explained that his department is responsible for two light rail projects: the River Line (opened in March 2004) and the Hudson-Bergen Light Rail (HBLR). The HBLR serves a major metropolitan area and links Hudson and Bergen counties in New Jersey. The line facilitates several intermodal connections, including links to PATH, the Trans-Hudson ferry, and various other rail and ferry connections. Construction has been divided into three major segments the first two of which are being built under a \$2 billion design-build-operate-maintain contract.

The first segment, which opened in April 2000, serves the New Jersey "Gold Coast," around which considerable new commercial development and residential redevelopment is centered. The first segment features low-impact design for simple, outdoor platforms. An elevated "wye" provides service into Hoboken Terminal and Weehawken. Mr. Santoro mentioned that the line has a proof of payment system; roving fare inspectors with power to write tickets patrolling the line to ensure payment.

The second segment, currently under construction, serves seven communities, includes seven stations, and is a major commuter connection to office space in New York City. Mr. Santoro told the group that a portion of the alignment had to be moved onto NJ Transit property after the agency ran into a conflict with a developer. The segment includes several key features, including a viaduct from Hoboken Terminal to the west

side of Hoboken, a passenger elevator at the 9th Street Station connecting to the Palisades, and the use of shotcrete to stabilize rock face on King's Bluff and in the Weehawken Tunnel. When asked about the cost of installing and maintaining shotcrete versus netting, Mr. Santoro told the group the shotcrete costs approximately 60 percent more than netting and has a 20-year lifespan. The Weehawken Tunnel is a particularly interesting challenge, and Mr. Santoro discussed the issues of stabilization and waterproofing in detail.

Mr. Santoro finished his presentation by telling the Roundtable that the third segment of the Hudson-Bergen line, a proposed 13-mile extension serving seven additional communities, has completed its conceptual engineering phase and is working on an environmental impact statement (EIS).

The participants had several questions for Mr. Santoro following his presentation. One member of the group asked how successful 21st Century Rail Corporation's operation and maintenance contract has been so far. Mr. Santoro replied that the company's performance has been in the 95 percent to 100 percent range and is therefore considered very successful. He also added that Washington Group, as operator, is managing and improving run-times. He stated that station cleanliness is the biggest issue facing the operating line at the moment, and that security is another issue. Another member asked if NJ Transit had any comparisons of quality of service between the River Line and the Hudson-Bergen Line, to which Mr. Santoro replied that customer satisfaction has been slightly higher on the Hudson-Bergen line.

When asked if NJ Transit had reviewed the Booz Allen Hamilton cost-per-mile study, Mr. Santoro answered that the Hudson-Bergen Line was used as a test project for the study; he answered "no" to an inquiry as to whether Booz Allen had included costs for operation and maintenance in the study data. In response to numerous questions comparing the River and Hudson-Bergen lines, Mr. Santoro stated that the Hudson-Bergen Line is a design-build-operate-maintain contract with very detailed specifications while the River Line, also a design-build-operate-maintain contract, was built under more generic specifications. He went on to emphasize that specificity of specs significantly influences the outcome in terms of quality for these projects. He also said that the proof-of-payment system is working well, and the line has a 2 percent fare evasion rate. The attendees had a brief exchange of individual solutions to fare avoidance.

Before the attendees departed for the construction tour, they took the opportunity to form three task forces to research and present selected issues at the next Roundtable meeting. David Ryan agreed to head a task force to explore errors and omissions issues. Takis Salpeas will lead a group comparing quality on design-build and design-bid-build projects. A third group is Systems Integration in Design Build. The group also agreed to provide hard-copy presentation summaries of their Around-the-Table remarks to every member of the group at future meetings. At that point, Mr. Carnaggio adjourned the participants, who toured the Hudson-Bergen Line construction sites and then the AirTrain to JFK alignment.

The tour ended the first day's agenda.

Tuesday May 4

REAUTHORIZATION OF FEDERAL TRANSIT PROGRAMS

Mr. Carnaggio reconvened the Roundtable and opened the Tuesday sessions by thanking NJ Transit for organizing a spectacular dinner for the participants that previous Monday evening. He then introduced Scott Biehl, FTA's Assistant Chief Counsel for Legislation and Rulemaking, who made a presentation on the status of congressional efforts to reauthorize the Federal transit programs.

Mr. Biehl began by reminding the group that reauthorization of the transit programs is linked together with reauthorization of the Federal-aid highway programs, and he observed that, this time around, there are some "fascinating politics" underlying reauthorization, especially insofar as the highway program. He then summarized the bill that has been passed by the House of Representatives – H.R. 3550, the Transportation Equity Act for the 21st Century ("TEA-LU") – and noted the following:

- TEA-LU would cover a six-year term (Federal fiscal years 2004-2009) and provide a total of \$283 billion in Federal funding. Of that total, \$223 billion would be allocated to Federal-aid highways, \$8 billion to highway safety programs, and \$52 billion to the Federal transit programs.
- All of the Federal funding under TEA-LU would lie within "firewalls," meaning that those funds could not be diverted in future years for anything other than surface transportation (*e.g.*, defense, homeland security, health care, or education).
- All of the Federal funding under TEA-LU would be "guaranteed," meaning that in future years, the Congress would appropriate *no less than* these amounts of funding for the highway and transit programs.
- The Federal funding for the transit programs under TEA-LU would be "split funded," in that 80 percent of the funds would be derived from the Mass Transit Account of the Highway Trust Fund, and 20 percent would be derived from the General Fund.

Mr. Biehl then summarized the bill that has been passed by the Senate – S. 1072, the Safe, Accountable, Flexible, and Efficient Transportation Equity Act of 2004 ("SAFETEA") – and noted the following:

- SAFETEA would cover a six-year term (FYs 04 through 09) and provide a total of \$318 billion in Federal funding. Of that total, \$252 billion would be allocated to Federal-aid highways, \$9 billion to highway safety programs, and \$57 billion to the Federal transit programs.

- Like TEA-LU, all of the funds in SAFETEA would lie within a “firewall,” and like TEA-LU, all of the funds in SAFETEA would be guaranteed minimums.
- Like TEA-LU, the Federal funding for the transit programs under SAFETEA would be “split funded,” but the percentages differ under the Senate bill; under SAFETEA, 83 percent of the funds for transit would be derived from the Mass Transit Account of the Highway Trust Fund, and 17 percent would be derived from the General Fund.

Next, both the House and Senate leaderships will name their respective members for a conference committee that will attempt to negotiate a compromise of the differences between TEA-LU and SAFETEA. Mr. Biehl predicted that this will be a “very difficult” conference this time around in reauthorization, for three reasons: First, the large number of people involved in the negotiations, representing no fewer than six principal congressional committees – quite simply, the greater the number of people at a table, the greater the likelihood of conflicting agendas, and the more opportunity for mischief. Second, the House and Senate are very far apart from one another, both on the amounts of funding and on several matters of fundamental policy. (He noted that when TEA-21 was enacted, in 1998, the conference committee required ten weeks of intense negotiations to reach a compromise between the House and Senate bills, and in that instance, the two bills were much closer to one another than TEA-LU and SAFETEA are this time around.) Third, the conferees will be negotiating with one another under the threat of a Presidential veto. Mr. Biehl explained that in the Administration’s view, both TEA-LU and SAFETEA entail too much spending, and that the President is determined to veto any reauthorization bill that would either raise the Federal gas tax to increase funding for highways and transit or employ any other kind of financing mechanism that would “hide the true costs of the bill from the Federal taxpayer.”

Additionally, Mr. Biehl stated that the Administration objects to the 3,000-plus “special projects” earmarked in TEA-LU for Federal-aid highways; the fact that neither TEA-LU nor SAFETEA do enough to encourage States to enact primary seat belt laws, or crack down on drunk driving; and that both TEA-LU and SAFETEA would enact exemptions from the Federal Motor Carrier Safety Administration’s hours-of-service regulations. Also, the Administration objects to the Senate bill’s special funding for AMTRAK – the Administration believes that all Federal assistance to AMTRAK should be provided under AMTRAK’s own authorization statute.

Mr. Biehl admitted, however, that Presidential vetoes are sometimes overridden. Indeed, he noted that the Congress overrode President Reagan’s veto of the bill that eventually became the reauthorization statute in 1987. Moreover, in this instance, the House of Representatives passed TEA-LU and the Senate passed SAFETEA by margins that are well higher than what is necessary to override a veto.

Clearly, the multi-year reauthorization of the Federal-aid highway program is always a very popular bill on Capitol Hill. Senators and congressmen see it as one of their most important opportunities to serve their States and districts constituencies by promoting

large infrastructure therein and creating and sustaining jobs for their constituents – thus stimulating both the national and local economies. Nonetheless, said Mr. Biehl, reauthorization will go nowhere until the Congress can resolve the two “linchpin” issues: (1) What to do about the Gas Tax, if anything, and (2) How to resolve the eternal debate between the “Donor States” and the “Donee States” in the Federal-aid highway program. A “Donor State” is any State that contributes more in Gas Tax receipts to the Highway Trust Fund than what it gets back in Federal-aid highway funding. A “Donee State” is any State that contributes less in Gas Tax receipts than what it gets back in Federal-aid highway funding. Usually, this battle between Donor States and Donee States is compromised through what we call a “Minimum Allocation”: a device whereby every State in the United States is guaranteed to receive a specified minimum percentage of every dollar it contributes to the Highway Trust Fund in Gas Tax receipts. During TEA-21, the Minimum Allocation has been set at 90.5 cents.

The 28 States that are “Donor States” -- California, Texas, and Florida among them – are lobbying fiercely to raise the 90.5-cent Minimum Allocation to 95 cents in the next authorization. In TEA-LU, the House is trying to accommodate the Donor States – while attempting to avoid a Presidential veto – through a procedural device called a “reopener.” Mr. Biehl characterized the “reopener” in TEA-LU as “rather ingenious.” In short, if it were enacted, TEA-LU would not raise the Gas Tax or the current Minimum Allocation during 2004, but TEA-LU would cut off all Federal-aid highway funding to all fifty States unless, by September 30, 2005, the Congress agrees to “reopen” the authorization statute to raise the Minimum Allocation to 92 cents by the end of Fiscal Year 2006 and 95 cents by the end of Fiscal Year 2009. As a practical matter, however, the only way to reach a 95-cent Minimum Allocation over that time frame is to increase Gas Tax receipts by an approximate \$11 billion.

Thus, if it were to enact the TEA-LU “reopener” or something like it, Congress could avoid the prospect of raising the Gas Tax until after the November elections.

Currently, TEA-21 has been extended through June 30, 2004. Mr. Biehl expects one of two things to happen by June 30th: either the Congress will pass another short-term extension through the end of the current fiscal year, or Congress will pass a longer term extension until after the election. Obviously, the current economic climate of record-high gas prices is not conducive to any discussion of increasing the Gas Tax – although there are several good arguments that the tax should be increased – thus, candidly, Mr. Biehl predicted that we will have to wait until sometime in 2005 before we get the next authorization statute.

Mr. Biehl then turned to a specific discussion of the TEA-LU and SAFETEA proposals for the Section 5309 programs, and made the following points:

1. Both TEA-LU and SAFETEA would retain the current split amongst New Starts, Fixed Guideway Modernization, and the Bus programs. Neither the House nor Senate agreed with the Administration’s proposals to move the funding for Fixed Guideway Modernization and Bus and Bus Facilities from the Section 5309 capital program to the

Sections 5307 and 5311 formula programs. Thus, TEA-LU would keep the current split whereby New Starts comprises 40% of the Section 5309 program, fixed guideway modernization comprises 40%, and Bus and Bus Facilities comprise 20 percent of the program, and SAFETEA has similar percentages. Mr. Biehl remarked that Congress simply cannot resist the temptation to keep earmarking the Bus program.

2. Both TEA-LU and SAFETEA would retain the current Federal-local matching ratio. Specifically, under all three Section 5309 programs, the matching ratio would be 80% Federal/20 % local unless a grantee requests a higher local share. Mr. Biehl noted, however, that both TEA-LU and SAFETEA would continue to emphasize local overmatch on New Starts projects as a key criterion for FTA to consider in rating a sponsor's local financial commitment for a project.

3. It's uncertain whether Congress will retain the current exemption from the New Starts criteria for projects seeking less than \$25 million in Section 5309 funds. The Senate bill (SAFETEA) would eliminate the current exemption from the Section 5309 criteria for both *project justification* and *local financial commitment* for any project seeking less than \$25 million in New Starts funds, but the House bill (TEA-LU) would keep the current exemption. The Administration strongly supports the Senate bill on this point.

4. Both TEA-LU and SAFETEA would establish "Small Starts" programs, but there are differences in the details. Both the House and Senate bills incorporate the Administration's proposal for a "Small Starts" program for projects seeking less than \$75 million in New Starts funds, to help encourage Bus Rapid Transit (BRT) and other types of low-cost capital improvements that can address congestion and travel demand in a corridor more quickly and flexibly than traditional fixed guideways. The two bills differ, however, in several important respects: (a) TEA-LU would fund the Small Starts program through a set-aside within the New Starts program, SAFETEA would not; (b) under TEA-LU, the Small Starts program would encompass only those projects seeking between \$25 million and \$75 million in New Starts funds, but under SAFETEA, the Small Starts program would encompass all projects seeking less than \$75 million in New Starts funds; (c) SAFETEA would expand project eligibility to non-fixed guideway projects, but TEA-LU would allow eligibility for Bus Rapid Transit only when an exclusive right-of-way for transit comprises the "majority" of the corridor in which the project lies; and (d) SAFETEA would vest FTA with the discretion to develop simplified criteria for Small Starts projects, whereas TEA-LU spells out the criteria FTA would have to apply to those projects. Mr. Biehl noted that all in all, the Administration much prefers the SAFETEA version of the Small Starts program as compared with the TEA-LU version.

5. SAFETEA would change the New Starts rating system. Unlike current law, whereby all projects in the New Starts pipeline are rated as "highly recommended," "recommended," or "not recommended," SAFETEA would require FTA to rate all projects on a five-tier regimen: "high," "medium-high," "medium," "low-medium," or "low." Mr. Biehl noted that the Administration endorses this aspect of the Senate bill for two reasons; the five-tier regimen would enable FTA to make more precise ratings of the

merits of a project, and the labels would negate the current perception that a “recommended” rating means the project is recommended for funding. Additionally, SAFETEA would add the reliability of cost and ridership forecasting as a criterion for project justification.

6. Neither TEA-LU nor SAFETEA would allow New Starts funding for Alternatives Analysis. Both bills would repeal the provision in the current statute whereby up to eight percent of New Starts funding can be allocated for Alternatives Analysis in any year. Thus, both the House and Senate are agreeing with FTA that project sponsors should finance Alternatives Analyses with the Federal planning and formula funds and other sources of funding.

7. SAFETEA would codify a requirement for Before-and-After Studies. Mr. Biehl reminded the audience that FTA’s New Starts regulations now require sponsors to conduct “before and after” studies that compare actual cost and ridership data, once a project is in operation, with the estimates for costs and ridership prior to construction. Apparently, the Senate likes this regulation so much that SAFETEA would incorporate the requirements into statute, and also require FTA to submit an annual report summarizing the results of “before and after” studies.

8. SAFETEA would require more frequent supplements to the Annual New Starts report. Currently, FTA is required to publish both the Annual New Starts report (it usually is published in February) and one mid-year supplement to that report (usually published in August). SAFETEA would require to supplemental reports, rather than one, to capture any significant changes to projects in the New Starts pipeline and note any projects that have advanced into preliminary engineering or final design. Conversely, TEA-LU would repeal the requirement for a supplemental report and mandate only the Annual New Starts report.

9. SAFTEA would explicitly enable FTA to allow Advance Land Acquisition and - Corridor Preservation. The Senate bill incorporates the Administration’s proposal to allow project sponsors to acquire land, in certain instances, prior to completion of the NEPA document for a project, and also incorporates the proposal to allow transit agencies to acquire freight railroad right-of-way for the purpose of preserving that right-of-way for future transit use.

A member of the Roundtable then asked whether either TEA-LU or SAFETEA have incorporated the Administration’s proposals for environmental streamlining, including, specifically, the proposal whereby a sponsor’s execution of a Memorandum of Agreement in compliance with Section 106 of the National Historic Preservation Act would also suffice as compliance with the historic preservation requirements of Section 4(f) of the DOT Act. Mr. Biehl replied that the Administration is very disappointed that neither the House nor Senate bill have incorporated very many of the Administration’s proposals for streamlining, nor this proposal, in particular. He added, however, that the American Association of State Highway and Transportation Officials (AASHTO) is still in negotiations with the National Trust for Historic Preservation on this subject, and quite possibly, something along the lines of the Administration’s proposal will be adopted in

the final bill. He also noted that neither TEA-LU nor SAFETEA have incorporated the Administration's proposed changes to Section 4(f) of the DOT Act, to help resolve a split among the circuits of the U.S. Courts of Appeals in terms of the way they interpret that statute.

Next, Mr. Biehl turned to another subject of interest to the Roundtable, Project Management Oversight. He said both the House and Senate bills for reauthorization would slightly increase the amount of funding available for FTA's PMO program – not as much as the Administration wanted, but an increase, nonetheless. Neither TEA-LU or SAFETEA would make any substantive changes to the PMO requirements, with one exception: both bills would require a sponsor's project management plan to address security as well as safety.

And speaking of security, Mr. Biehl alerted the Roundtable to several potential changes to the law, both through the future reauthorization of the Federal transit programs, and through various bills that have been introduced in the House and Senate separate and apart from reauthorization. He noted, specifically, that both TEA-LU and SAFETEA would make Section 5307 Urbanized Area Formula funds available for security training and drilling for transit agency employees; both bills would make security an element of FTA's determination of a sponsor's technical capacity to carry out a project; and both bills would expand FTA's authority to investigate safety hazards to include security risks, as well. He also suggested that members of the group might want to examine three particular bills that have been introduced in Congress: H.R. 4143/S. 2289, the "Railroad Carriers and Mass Transportation Protection Act of 2004"; S. 2273, the "Rail Security Act of 2004; and S. 2453, the "Public Transportation Terrorism Prevention Act of 2004." All three of these bills would vest the new Department of Homeland Security (DHS) with authority to promulgate regulations for security in mass transportation operations, and all three bills would provide a good deal of Federal funding, through DHS, to local transit agencies for both capital security facilities and equipment and certain types of operating expenses, including training and technical assistance.

Lastly, a member of the Roundtable asked whether there is any truth to the rumor that Congress might pass a two-year reauthorization bill instead of a six-year bill. Mr. Biehl replied that it's possible; certainly, that Congress might enact such a bill, and he pointed out that the "reopener" provision in TEA-LU he described earlier would function, in a sense, as a two-year bill. He thought it more likely, however, that Congress will pass another short-term extension of TEA-21 – either for a few months to the end of this fiscal year, or an extension into Spring 2005, after the November elections – in hopes of keeping the pressure on itself to conclude negotiations for a six-year bill.

This concluded Mr. Biehl's remarks.

[FTA Heavy Rail Transit Capital Cost Study](#)

Richard Laver, of Booz Allen Hamilton (BAH), presented the results of the FTA-sponsored Heavy Rail Transit Study, a follow-up to the FTA Light Rail Study presented at the twenty-first Roundtable. The Heavy Rail Transit (HRT) cost study is similar to the light rail study, in that it analyzed costs using the same methodologies and is accessible via a database with similar features.

According to Mr. Laver, the project's goals and objectives were to: document the "as-built" costs for a wide range of HRT investments; develop unit-cost relationships for all HRT project components; and better understand what drives the cost difference between projects. In addition, FTA wanted to determine how HRT investment costs are changing over time, and develop an HRT cost calculator similar to the one in the light rail study. The study included three primary steps: defining the database, populating the database with actual HRT projects, and performing cost analyses.

To define the data base, Mr. Laver told the group, it first needed to be improved to yield more accurate modeling results. To do so, BAH segmented underground alignment into four types; stations into three size groupings; subway stations based on construction type; and utility relocations and right-of-way (ROW) acquisition by urban versus suburban. BAH also detailed the breakout of station access investments, and revised the database structure to document basic design characteristics that influence project costs. The final database identifies eight primary cost categories and cost elements:

- Guideway elements
- Yards and Shops
- Systems
- Stations
- Vehicles
- Special Conditions
- Right-of-Way
- Soft-Costs

For each project cost element, the database documents the total cost, unit quantity, and mid-point of construction. These data are then used to calculate unit costs. The improved database uses linear feet as its measure, and adjusts for international costs (determined by published indices).

The database, Mr. Laver continued, was populated with the "as-built" capital costs for thirty HRT projects, which represent a broad range of costs, sizes, and alignment types. The study also included a wide range of lengths and guideway types. BAH is aware that there is not really such a thing as a "typical project," but it is using that concept to describe the model.

The populated capital cost database provides a platform for conducting a broad range of cost analyses, including normalized and adjusted unit costs, unit cost functions, and project cost variance. Interestingly, BAH found that HRT costs are not as sensitive to quantity as light rail projects. The study developed over sixty different unit cost functions, one for each cost element type. This is an example of an improvement to the database, which now provides a better understanding of cost differences. Cost functions explicitly recognize the factors that drive cost. The study hypothesized that New Starts

capital costs include both fixed and variable components (implying economies of scale). The estimated unit cost functions capture the economies of scale associated with increased investment.

The unit cost function, Mr. Laver went on, provided the basis for development of a capital cost calculator—a tool for estimating total project costs for proposed HRT projects. The calculator can be used either to generate a preliminary cost estimate if none is available or provide an independent reference point to help validate an existing cost estimate. Users generate cost estimates by entering both the unit quantities, projected mid-point of construction, and project location. It then uses the unit cost functions to estimate a total project cost (including project soft-costs), and automatically adjusts costs for inflation and regional cost differences.

Mr. Laver stated that there are frequently wide cost variances from one project to another, which result from a variety of factors. The HRT capital cost update addresses the quantitative component of these cost drivers through development of a cost variance analysis tool. The tool compares unit cost and unit quantity values for a selected database project against an average of “typical” HRT investment referred to as the “Standard Model HRT.” The Standard Model HRT is defined as the average mix of alignment grades, trackwork types, station densities, fleet size, etc. across all projects documented in the capital cost database. Mr. Laver stressed that “standard” is not FTA’s word—BAH took it from accounting practice. By comparing the two, BAH has provided a baseline for identifying what drives project costs for individual projects relative to a typical HRT investment.

The study found that cost differences between an actual project and the Standard Model HRT arise from variations in unit quantities and variations in unit costs. The mix of assets within the Standard Model HRT is scalable to reflect the dimensions of the project under analysis. Scaling provides a valuable means of analyzing cost differences across projects of varying size. Using the Standard Model HRT, unit costs decline with project size, reflecting economies of scale; project cost actuals exhibit similar behavior. The database’s log-log format underscores the relationship between project size and unit cost, especially for cost actuals adjusted to a common asset mix.

BAH then posed the question, “What drives costs for the highest cost projects?” The study identified an investment as high-cost if its total unit cost variance was more than 25 percent above that predicted by the Standard Model HRT. After analyzing the projects in the database (five of which were identified as high-cost), BAH found cost variances were highest for the guideway elements, systems, special conditions, ROW, and soft-costs (with guideway elements and soft-costs the highest contributors to the variance). This naturally inspired the question of whether guideway costs and soft-costs are related. The analysis showed that they are directly proportional.

Trend analysis suggests that costs for many HRT cost elements are increasing at the same rate or less than general construction inflation, thereby eliminating the possibility of cost differences due to unit quantities.

In conclusion, Mr. Laver pointed out the study's key findings. Unit cost functions are influenced by economies of scale. The Standard Model provides a reasonable basis for assessing why project costs are higher for some projects and lower for others. Cost variance is driven by high risk elements.

With that, Mr. Laver opened the floor for questions. One member of the group asked if the cost calculator would have to be updated every six months to account for inflation. Mr. Laver replied that there is a forecast from the Mean Construction Index built into the system, but it will have to be updated periodically for accuracy. Another Roundtable member wondered if the cost data that BAH collected from HFT projects included contractor claims. Mr. Laver answered that the database includes every known cost—including contractor claims. In response to a question as to whether BAH factored in topographical/geographical elements, Mr. Laver responded that they are in as far as BAH was able to get them. He added that as the database becomes more populated it will contain more in-depth information about this topic. Finally, when asked when the database will be ready for agency use, he said that FTA will make it available in the summer of 2004, but the study is available now through FTA.

This concluded Mr. Laver's presentation.

Remarks from the Deputy Administrator

Robert Jamison, Deputy Administrator, FTA, took a moment to address the group. He said he always likes attending the Roundtable. Mr. Jamison went on to mention that he testified in front of the Committee about the New Starts program last week. There was intense scrutiny, he said, of transit's ability to mitigate congestion in densely populated areas; the Committee also had a lot of questions pertaining to cost/ridership benefits. He told the representatives that FTA and the agencies need to raise the bar by delivering on promises of cost-effectiveness and efficiency of projects. Mr. Jamison believes that this Roundtable can have a big impact on the outcomes of future funding and legislative support by meeting deadlines and creating innovative projects; doing so lets everyone look transit critics in the eye and give solid justification for program growth. He stressed that, at the moment, ridership benefits are the key focus of the Committee's scrutiny, but that improvements are now trending up (after experiencing some growing pains).

Mr. Jamison went on to remind the group that consistent project quality across the country is critical, because "we are only as good as our worst project" in the eyes of the legislature. They carefully compare projects in the pipeline to failures, not successes. With that in mind, FTA is embellishing its role as keeper of the national transit database by focusing its research efforts on cost drivers with an eye to reducing costs. With cost reduction a priority, risk assessment by the agencies is going to become more important, and sponsors will be required to provide recovery plans when applying for Fully Funded Grant Agreements (FFGA). He concluded his remarks by telling the Roundtable that FTA is doing everything it can to develop tools and resources that will help the agencies meet their budget and scheduling goals.

Risk Assessment

David Vozzolo, Chief of the Analysis Division, FTA, gave a presentation on risk assessment, which included FTA's definitions of risk and provided an outline of the risk analysis and risk mitigation processes. He also updated the Roundtable on the present status of risk assessment at FTA.

Mr. Vozzolo told the group that many properties are already doing risk assessments for their projects, either on their own or in conjunction with FTA, and that risk assessment has been a strength of private industry for years. In fact, many contractors perform risk analyses before bidding on transit projects. FTA is encouraging project sponsors to use risk analysis as an effective management tool, as FTA is using it as an effective project management oversight tool. Very soon, he continued, FTA will require risk assessments in the final design of FFGA projects, and shortly thereafter for projects in Preliminary Engineering (PE). The goal is to integrate risk assessment throughout the entire planning process for future projects, and FTA wants to create a cooperative effort with project sponsors to develop an efficient and effective process. To do so, communications and consistency are critical, and FTA is preparing methodologies and procedures, documenting lessons learned, and developing training courses and materials that will streamline the process in the future.

FTA defines risk as an unexpected event or circumstance that has a chance of occurring and that may prevent a project from meeting its schedule and cost estimate. Risk assessment can be a subjective exercise to estimate probability and impact of risks, but FTA believes this definition gives agencies the opportunity to quantify; according to Mr. Vozzolo, quantification is the key to successful analysis. By quantifying risk, agencies are better able to keep projects on schedule and within budget.

Risk is analyzed by comparing project cost and uncertainty over time, resulting in a bell curve that (hopefully) reduces the variance between the estimated cost in the early phases of the project (conceptual planning, alternatives analysis, PE, final design) and the actual cost at the end of construction.

Risk impacts the scope, budget, and schedule of any project. It is up to the project sponsor to try to determine the risk of potential external pressures to change a project's scope, the risk of internal or external events that force the project team to work beyond the estimate just to meet the project scope and statement of work (*i.e.*, extreme weather, contractor non-performance), or the risk that budget elements will deviate from the estimate. To do this, FTA recommends prioritizing risk by probability (unlikely to almost certain) and impact (minor to catastrophic). Doing so allows the agency to make adjustments for risks that will prove critical to the success of the project.

Mr. Vozzolo told the group that Parson's Transportation is writing a risk analysis procedures document for FTA that will be available to agencies within a few months. For now, he provided a basic outline of the steps in the risk analysis process:

- Validation of Base Conditions
- Risk Identification and Quantification
- Assessment (Modeling)
- Discussion/Review
- Risk Mitigation Planning
- Implementation/Monitoring

He stressed the importance of assigning an interdisciplinary team to perform the risk assessment so as to have maximum input into the project's potential risks. A team can also help establish the base costs (which strip out any contingency items from the estimate)—critical to an accurate assessment of the total cost when added to the cost of identified risks.

Mr. Vozzolo suggested the next step should be the creation of a risk register to identify, categorize, estimate the probability of, and estimate the impact of risk. He cautioned the group against overdoing the list of possible risks, stating that priorities can get lost in a pile of worries. Using the risk register, he continued, each cost estimate line item and each risk item is assigned a probability curve. Probability curves are chosen by evaluating the behavior of each risk item (the simpler to estimate, the better). He said these probability curves become important to simulation modeling. For instance, Monte Carlo simulation modeling software performs thousands of distributions for each risk item and uses them to create a new cost distribution.

Simulation and modeling methods are appropriate for evaluating complex projects and risks, integrating cost and schedule assessments, and creating a dynamic critical path schedule. Non-simulation methods (for example, Expected Value and Variance or PERT) are appropriate for simple risks, cost and schedule assessments (not combined), stable critical path schedules, current year or YOY (year of estimate) estimates. Non-simulation methods are less powerful and do not provide much integration of cost risks.

Project risk assessment is critical to understanding the possible challenges and overruns a project faces, but risk mitigation strategies are critical to its success. Risk mitigation has four basic components: management action, contracts, insurance, and contingency. Mr. Vozzolo encouraged project managers to set-up processes that they can control (*i.e.*, creating strict financial controls to mitigate fraud and waste risks). He also pointed out that contingency planning is a strategy unto itself. The important part of risk mitigation, he said, is to set goals and quantifiable success metrics and manage to them. Mitigation reduces the range of total cost variances by helping agencies to identify opportunities for savings throughout the life of the project.

Next, Mr. Vozzolo described the lessons learned and success stories from five completed risk assessments on real projects in Los Angeles, Pittsburgh, Charlotte, Las Vegas, and Cleveland. He also presented sample management tools: a Top 5 risks schedule, a risk trend analysis report, and a management oversight report. Mr. Vozzolo concluded his presentation by pointing out that risk assessments have only been in practice for approximately 18 months, yet they are already producing results. FTA is learning as

much as possible from completed projects and using those lessons to improve methodologies, guidance, and training. FTA's goal, ultimately, is to produce consistent analysis of results, alleviate uncertainties, and complete projects on time and within budget. Because information sharing is so critical at this juncture, FTA is developing training workshops to disseminate information and tools, which will be available to agencies soon.

Mr. Jamison interjected the comment that FTA is hoping risk assessments will increase the probability of project success. He pointed out that risk analysis helps drive management decisions and provides a consistent method of determining cost, thereby improving fairness and accuracy.

Mr. Nagaraja took this opportunity to comment that the confidence, maturity, and experience of the project sponsor should be a factor of risk. He pointed out that FTA's guidance information asks for independent risk assessments by the PMO, who generally wants to use a different methodology and takes six months to complete the assessment. Mr. Nagaraja believes the PMO should evaluate and comment on the grantee's risk assessment rather than conduct an entirely independent assessment, because the grantee knows more about the project and will have more insight into the potential risks.

Mr. Salpeas interjected that project staff knowledge and experience is critical because accountability for risk is important. He believes that risk assessment need to be project specific. Mr. Salpeas and Mr. Nagaraja volunteered to lead a task force to improve assessment guidelines.

Mr. Carnell pointed out that independent risk assessments by PMOs absorb a lot of time and impact the agencies' ability to stay on schedule. Small agencies especially do not have the staff to assist the PMO with an independent assessment. He insisted that FTA deliver results as quickly as possible so as not to become a risk itself. Mr. Jamison told the group that applying for grants earlier will make assessments more of a management tool throughout the process and minimize the burden to agencies. Mr. Durant told him that the agencies need the tools to be available soon, the software especially, to be able to incorporate them into earlier phases of current projects.

This discussion concluded Mr. Vozzolo's presentation.

South Corridor Light Rail Project Risk Assessment

Frank Ward, Construction Manager, Charlotte Area Transit System, presented CATS' risk assessment for the South Corridor Light Rail Project. This assessment was done in conjunction with a PMO.

The South Corridor alignment is 9.6 miles, comprised of 15 stations and 7 park-n-rides. The line operates seven days a week, 20 hours a day, and has a budget of \$398.7 million. Mr. Ward presented a series of project milestones from February 2000 when the LPA (???) was adopted through the anticipated start of service in October 2006.

CATS incorporated risk assessment into the project when FTA began requiring it as a condition of final design approval in August 2003. In preparation for a risk assessment workshop in September 2003 (during which an interdisciplinary team would review plans and cost estimate backup, identify risk impacts, and prioritize risks), the PMOC (???) created 41 project cost units (PCU) and a risk register. CATS distributed costs to the 41 PCUs and identified risks by PCU as part of the assessment workshop. Mr. Ward included a sample of the project's risk register for the group to study.

Based on the workshop analysis, the PMOC prepared a risk assessment report in November 2003. The assessment was based on 30 percent completed plans and a cost estimate from June 2002. The PMOC used the report's conclusions to assess the likelihood of completing the project at or below budget (based on statistical analysis). The forecast required a contingency plan. Unfortunately, said Mr. Ward, the PMOC reported the results to FTA before it reported them to CATS, and certain inaccuracies caused problems for the agency. He recommended that in the future, agencies have the opportunity to review PMOC reports before they are reported to FTA.

Next, Mr. Ward outlined the highlights of the risk assessment report, which indicated 32 percent likelihood that the project could be completed at or below budget and identified real estate as the highest risk with a value of \$10.8 million. This inaccuracy forced CATS to provide a justification that reduced the most likely risk of real estate cost to \$1.2 million. As a result, FTA ordered the PMOC to prepare a new assessment. The second assessment found 86 percent likelihood that the project could be completed at or below budget. CATS conducted its risk mitigation workshop in December 2003, and found that the December 2003 monthly real estate status report budget was \$2.4 million higher than the June 2002 budget that had been used to determine base costs. Therefore, a third statistical analysis was prepared for FTA review. This assessment found 65 percent likelihood that the project could be completed at or below budget. Mr. Ward pointed out the differences in percentages between the three reports and advised agencies to provide very accurate numbers and update risk registers frequently when conducting their own assessments.

CATS's risk mitigation plan, Mr. Ward continued, focused on the Top 13 risks, which together equaled 90 percent of the total risk. The agency organized risk into three categories: reduction/prevention, transfer/sharing, and acceptance. It went on to identify the scope, responsibility, mitigation costs, savings, and schedule for the risks in all three categories. Mr. Ward shared examples of the project's top risks and the mitigation strategies CATS implemented to balance them.

Finally, Mr. Ward told the group that the next steps in the process require the PMOC to update the risk assessment report and probability and submit the report to CATS and FTA by mid-May 2004. Then CATS will update its risk mitigation plan by mid-June, after which it will initiate the PMOC FFGA spot report and final capacity review for FFGA application.

According to Mr. Ward, CATS learned some valuable lessons about risk assessment during this project. Agencies must understand the assessment's intent before beginning. Risk values should be based on historical data. Most importantly, agencies should be involved in the report development and have the opportunity to review the risk assessment team's qualifications before submitting to an independent risk analysis. He agreed with Mr. Carnell's earlier comment that the independent assessment took a tremendous amount of staff and consultant time and provided minimal benefit over an agency assessment. He suggested making the assessment process transparent, and urged FTA to issue guidance to agencies by stating acceptable risk thresholds soon. He also suggested making risk assessment a requirement for entry in PE, and updating the assessment at 30 percent complete, and 65 percent complete to take advantage of the opportunity to mitigate more risk earlier in the planning process.

Mr. Vozzolo added that FTA has not yet established thresholds for acceptable probability because it doesn't want to fix a number before understanding all the implications. He believes that it is more likely FTA will set a range of acceptable probability rather than a fixed number. He also stated that FTA sees a need for cost benefit analysis in risk assessments, and wants to get a sense of what benefits really cost as it tracks existing projects. He urged participants to remember that risk assessment is still a new process, and it is being improved for the benefit of the agencies.

This concluded Mr. Ward's presentation.

[AirTrain to John F. Kennedy International Airport](#)

Steven Plate, New York Airport Access Program Director for the Port Authority of New York and New Jersey, gave a special presentation of the AirTrain to JFK project that the Roundtable participants saw during Monday's construction tour.

Mr. Plate pointed out that roadway access to the airport from Manhattan is very limited and is increasingly congested as a result. Because roadway expansion is unlikely and ground access limits the future growth of the airport, Port Authority decided to create a dual system that combines an on-airport people mover with increased off-airport access—the AirTrain. Port Authority chose to pursue a design-build-operate-maintain contract, as it has found this guarantees quality the first time and reduces unforeseen costs.

AirTrain is an 8.1-mile, fully grade separated two-track system. The driverless vehicles are operating on steel wheels and a steel rail track. There are provisions for airline ticketing and check-in for passengers at the Jamaica station, and extensive off-airport long-term parking. The alignment connects to the Long Island Railroad, numerous subway lines at Jamaica, also connects to the NYCT "A" train at Howard Beach. The LIRR provides direct access to Penn Station NYC, which takes about 20 minutes. AirTrain has a growing ridership of approximately 34,000 per day.

The system has a 32-vehicle fleet to serve the anticipated number of riders per day. The vehicles have steel wheels and use a linear induction motor (LIM) for propulsion. There are up to four vehicles per train—each has a capacity of 97 people plus baggage. The stations have 240-foot elevated platforms, and elevated connectors to terminals, moving walkways, and heated/air conditioned glass-enclosed lobbies. The system includes a state-of-the-art operations center, from which one or two operators can run the whole fleet.

Mr. Plate told the group that building along the Van Wyck Expressway was the biggest challenge to the project, as lanes were only closed during off-peak hours. Port Authority worked in conjunction with New York State and New York City Departments of Transportation and other agencies as a public/private partnership to complete the work.

Mr. Plate shared that Port Authority chose to build the system with a design-build-operate-maintain contract for several reasons. First, this structure creates a single point of responsibility. Secondly, this method enables design and construction to be put on a fast track, reduces project costs and schedule, improves quality, and increases cost certainty. It also reduces the owner's role and the size of staff required, and brings construction expertise upstream. Port Authority modified the contract provisions to create a contingency fund with bonus provisions (to cap risk), build in corporate guarantees, reduce owner design reviews, and assign responsibility for quality control to the contractor. Port Authority took responsibility for quality assurance.

The project team was specially selected from Port Authority staff, consultants, and specialists, who were collocated in one project office. Port Authority also created a communications outreach office to provide information to the community, drive support, and minimize disruptions to the project staff. The contractor selection process was fairly straightforward, if extensive. Port Authority evaluated proposals and initiated final negotiations with a short list of (3) firms, selected the best value proposal, and awarded the contract to AirRail Transit Consortium. The contract included a \$129 million contingency fund and a five-year Operations and Maintenance contract for \$105 million, with two-five years extensions, if desired by the Port Authority.

Mr. Plate explained a few of the major challenges to the AirTrain project. Integrating different corporate and professional (and even social) cultures proved very challenging. Coordination management was difficult because timely coordination with outside agencies was essential to keep the project on schedule. He finished by summarizing the project's expectations versus performance thus far.

The group engaged in a brief questioning session with Mr. Plate, after which there was a break for the three task forces to meet and formalize their approach to developing issues and presentations for the next Roundtable.

Litigating in the Dark: The Fourteenth Street Tunnel Case

Phil Staub, Associate General Counsel, WMATA, presented an overview of *Kiska-Kajima vs. WMATA*, a case of contractor relations gone bad that went all the way to the Supreme Court for resolution. WMATA ultimately won this case, and Mr. Staub's presentation included not only an overview, but valuable lessons learned that could be of benefit to transit agencies in the future.

WMATA's metro system was recently recognized as one of 40 "projects of the century" by the American Society of Civil Engineering, and is one of the most experienced transit agencies in the country. When the agency set out to extend the Green line, it included a tunnel at 14th Street—an urban soft-ground tunneling project that required dewatering to maximize face stability. WMATA left the dewatering up to the contractor—assuming that the contractors would be more knowledgeable in this area—to allow flexibility during construction and enable estimated costs for the project to be built into the bid. In the RFP, WMATA used performance-based specifications of dewatering two feet below the invert standard. In the past, WMATA had used closed-faced tunneling with one-pass liners when constructing transit tunnels. The process was thought—at the time—to be state-of-the-art and faster than other methods. However, it required extremely precise tunnel guidance and proved not to be watertight. When two-pass liners overtook one-pass as state-of-the-art, they cut mining time and resulted in drier final tunnels. However, it was not considered safe to do in a dense urban area; open-faced mining was thought to permit more surface subsidence

When designing the tunnels, WMATA planned twin 3,200-foot tunnels and three shaft structures, with twin tangents in the shallowest ground (all of which ran uphill). The agency had to consider the urban setting, which included overhead properties and a complex network of utilities. WMATA was impressed with two-pass tunnel construction, particularly the dry final tunnels, and wondered if an open-face two-pass method would work in an urban setting. The tunnels went through an iterative design process, exploring many alternatives. The first tunnel alternative report (TAR) recommended the one-pass approach with a close-faced machine. WMATA asked the designers to reconsider the two-pass open-face method. The second TAR still recommended the one-pass close-faced approach. WMATA once again asked the designers to reconsider all ground control methods. The third TAR stated the two-pass with open-face machinery method could be feasible if a grout canopy (an umbrella on the surface that minimizes ground movement and settling) was installed and if the contractor performed extensive ground dewatering. The design contractor recommended the option in the third TAR, and created a dewatering design. The computer model called for over 300 wells, but human experience estimated 60 wells would be sufficient, and most of the wells on the model were crossed out by the design team. Finally, the design called for an observational dewatering system of 60 initial wells with complete shafts. WMATA and the contractor would observe the draw-down for 90 days and dig additional wells as needed by unit price. In the RFP, the dewatering specifications included a mixture of the initial design criteria and performance standards (with provision for extra wells as needed) and warned that the contractor may encounter water during excavation.

Unfortunately, the performance-based specification that the contractor maintain groundwater at two feet below the invert remained in the contract; this specification is what the winning contractor used as a basis to file suit against WMATA. Mr. Staub strongly cautioned agencies to be careful about setting stringent performance standards within provisions that present all or part of a design element. Note that the owner, not the contractor, may be held accountable for the design meeting the stringent performance standard.

WMATA also provides a geotechnical report as an opportunity for design contractors to speak directly to the tunnel contractors, to lay out the advantages and disadvantages of the considered tunnel methods, give reasons for the choice of two-pass open-face methodology, and lay out the anticipated ground conditions.

Because there was partnering on the project which dovetailed with the disputes review board (DRB), WMATA also included a disputes clause that outlined a hierarchy of grievance resolution: first the DRB would hear a grievance; then the contracting officer would have the final decision. In the event that decision was contested, the Board of Contract Appeals would be the final arbiter.

When WMATA released the contract for bids it used the sealed bid method, in which the lowest bidder wins. The contract was awarded to Kiska-Kajima, a joint venture of two experienced tunnel contractors that were both new to the DC area at the time. The contract awarded \$42.9 million including estimated items and a safety incentive. Kiska-Kajima immediately proposed a value engineering change proposal to do the project for less money if WMATA went back to closed-face one-pass. However, the proposal did not include any dewatering or grouting and WMATA chose to stick with its original specifications.

Mr. Straub touched on some of the contractor's performance highlights. They were slow to start; however, he said this is to be expected when contractors are new to an area. They didn't follow the observational dewatering system, and had difficulties preparing and maintaining the mining equipment. WMATA had to hire experienced tunnel hands to help Kiska maintain the equipment. A WMATA geologist made intricate maps of the tunnel face, which ended up being very useful during litigation. Extensive surface subsidence detection equipment in place monitored the surface and never detected anything outside the contract limits.

Despite some difficulties, the contract had gone fairly well. When WMATA was served with a complaint demanding \$44 million (on top of the \$42.9 million bid) based on five claim theories, including fraud and breach of contract, the agency was shocked. It had never before been accused of fraud. To make matters worse, the contractor brought these claims "outside the contract," meaning the claims couldn't be settled by any of the built-in contract remedies or by the hierarchy of grievance resolution. Instead, they sued, and took the matter to the U.S. District Court, District of Columbia, demanding a jury trial. WMATA had never tried a contract case before a jury or in District Court.

WMATA's first step was to file a motion to dismiss, on the grounds that Kiska-Kajima had failed to exhaust the contract remedies and that its claims were, in Mr. Straub's words, "dressed up." However, Kiska-Kajima argued that it had no remedy through contract disputes provisions. The court decided that it would hear the case. Without the advantage of the DRB or Board of Contract Appeals, WMATA lost the knowledge and expertise those bodies have about the project and construction in general. Suddenly, WMATA needed to make changes to its strategy. A jury of lay people wouldn't understand a detailed argument full of engineering specifications. WMATA had to create a less detailed argument, file motions aimed at eliminating claims, put together exhibits that tell a story through the documents, and bring in appealing and articulate witnesses. To be safe, WMATA hired as lead counsel an outside firm with more experience trying cases in this environment; however, the agency remained deeply involved in the preparations for litigation to learn about the process for the future.

The first phase of litigation was discovery, which took approximately one year. The process was fairly typical, except the opposing counsel used the depositions taken during the discovery phase to make his case and argue with witnesses. He manipulated the documents and the readings thereof to influence a lay jury. This strategy gave WMATA ample opportunity to observe his tactics and learn more about from where these claims were coming. WMATA's first priority was to eliminate the fraud claims, and tried to have them thrown out by invoking sovereign immunity (meaning that without consent, the state cannot be sued). For instance, the agency has not consented to non-contract suits related to discretionary decisions. Here, the type of immunity at issue was WMATA's design immunity. The court agreed that decisions regarding mining, dewatering, and other construction methods were protected by design immunity and threw out the misrepresentation (fraud) claims. However, it allowed Kiska-Kajima to bring all of the same evidence in support of their remaining claims.

Next, WMATA filed motions to exclude certain evidence; for example, the dewatering specification. Kiska-Kajima argued that the "two feet under invert" specification was a guarantee for dry mining conditions. WMATA argued that, read as a whole, its specifications warned bidders that mining could encounter wet conditions. Unfortunately, the court held that the wording in the contract was ambiguous and that the jury should determine its meaning.

Mr. Staub explained the trial by focusing on strategy decisions that benefited WMATA. The contractor chose its assistant project manager as the "corporate representative" for the trial. The corporate representative sits at the counsel's table during the actual trial. Kiska's assistant project manager had previously been banned from the work site by WMATA for making grossly incompetent decisions that cost the city considerable time and money to rectify. WMATA chose the assistant project manager for the entire Mid-E Line, a very well-spoken and experienced man who has since been promoted to Director of Construction.

The trial became a battle of themes—the thread that holds the trial elements together and forms the basis of the case. Kiska-Kajima's theme was that WMATA purposefully

duped the innocent contractor into underbidding the contract through a massive conspiracy involving designers, their subcontractors, and hundreds of WMATA employees. WMATA's theme was that two experienced tunnel contractors had agreed to build tunnels for \$42 million and now want another \$44 million.

The U.S. District Court is equipped to accommodate very high-tech presentations of evidence. Both paper and electronic exhibits can be displayed and manipulated on a large flat panel screen and on smaller display screens for each of the jury members, the judge, and the attorneys. The court transcript is recorded in real-time. Kiska-Kajima took full advantage of the court's technological capacity to present elaborate DVD presentations with 3D animations of tunnel work. WMATA took a lower key approach, believing slick presentations would not serve its best interests. Indeed, WMATA was able to reveal how the opposing counsel was manipulating the reading of key documents and leading witnesses by using the lower-tech approach.

The trial began on January 22, 2001 with the interrogation of key witnesses. Kiska-Kajima's key witnesses were managers and experts. WMATA's key witnesses were field personnel and managers, who spoke with authority and told a consistent story to the jury. Counsel delivered closing arguments on February 20th, and the jury deliberated for approximately two weeks before delivering the verdict on March 5th. The jury found unanimously in favor of WMATA on both remaining counts. The contractor immediately filed a motion for a new trial, but the judge denied the motion based on the preponderance of evidence that had been weighed by the jury. This is a fact-bound case.

The contractor appealed in the U.S. Court of Appeals – D.C. Circuit. This court is one of thirteen circuits nationally. The first appeal in any case is a matter of right, and Kiska-Kajima took advantage of this right to hire a new attorney—Ken Starr, the former Independent Counsel who gained notoriety in the 1990s for his investigations of President Clinton. Because the judge stated in the record that this was a fact-bound case, they had to base their argument on the court's legal decisions to grant motions to dismiss claims and to leave the interpretation of the dewatering specifications up to the jury. The appellate court reviewed the district court's decision to throw out the contractor's fraud claim against WMATA based on design immunity. Kiska-Kajima argued that design immunity should not permit fraud. WMATA argued that design immunity includes choosing methods of construction. The court decided that the real issue was not design, but what WMATA chose to put into the contract, and that contract immunity was legal.

Next, the court reviewed the district court's decision that the jury should interpret the dewatering specification. All the parties agreed that the district court should not have left the interpretation of the specification up to the jury. After reviewing the specification, the appellate court found it patently ambiguous and told Kiska-Kajima that they should have made inquiries before making their bid. Because they didn't do their due diligence, the court said, they lost their right to argue. The court read the decision in favor of WMATA. Mr. Staub pointed out that, had Kiska-Kajima won this issue, they could have argued that WMATA breached the contract by definition, that the jury had been mistaken in finding no breach, and that they were entitled to a new trial.

Kiska-Kajima decided to push their appeal to the Supreme Court; however, the court is discretionary and it is not necessarily a right to have your appeal heard at this level. A plaintiff must petition the court to have its case heard. If the petition is granted, further briefs on the merits of the case are filed, and are followed by oral arguments. The petition must establish a reason for the court to grant a review of the case; generally, the court only hears cases in which there is a conflict between circuits or on issues of national import. Mr. Starr and Kiska-Kajima argued that WMATA's sovereign immunity was too broad and represented an issue of national importance. Their petition asked the Supreme Court to overturn decades of case law to prevent compact agencies from using their immunity against the public interest.

WMATA could have declined to file an opposition, but found it too risky a strategy in case the court decided to take the case, so the agency filed a brief. The contractor filed a brief reply, and then filed a motion for leave to file an *amicus* (friend-of-the-court) brief, from an outside party in support of one side—in this case, the General Contractors Association of New York. According to law, both parties must grant permission for an amicus to be filed, and WMATA declined to permit Kiska-Kajima to file the brief. The General Contractor's Association of New York petitioned the court to be allowed to file, and the court responded by allowing the Association to file the brief and then denying Kiska-Kajima's petition. At this point, the case could go no further, and the contractor was forced to drop their suit.

Mr. Staub told the group that WMATA learned several valuable lessons from this experience. Most importantly, do not mix performance-based and design-type specs lest the owner be held to high performance standards. He said it is very important to include and incorporate appropriate design data and opinions into the contract, and to highlight any information in the contract that is not complete. Agencies should state in the contract that contractors are encouraged to seek the additional information available in the owner's project library, and take pains to make those library materials available and accessible. He also encouraged the group to include appropriately labeled superseded opinion matter in the project library.

He went on to say that district court litigation is a lengthy, costly process. Claims that would be dismissed by a dispute review board receive more serious consideration from less experienced courts. However, the juries are smarter than one might expect, and it is important to tailor the case to them. The lesson learned: at trial, the side with the easiest-to-follow story wins. However, Mr. Staub concluded, agencies should never avoid innovation for fear of litigation.

A brief question and answer period (mostly about case specifics or definitions) followed, and Mr. Salpeas brought the discussion to a close by urging agencies to take their documentation very seriously; it has to be flawless to prove a case, so be careful and sure with the words used in all contract and project documentation.

This concluded Mr. Staub's presentation.

New Jersey DMU Project

Stelian Canjea, LRT Program Manager, NJ Transit, presented an overview of the Diesel/Electric Multiple Unit (DMU) light rail vehicles NJ Transit employed on the River Line.

The River Line's DMU vehicles (GTW/2/6) were developed by a Stadler and Bombardier consortium, manufactured and partially tested in Switzerland and Germany. The vehicles have 70 percent low floor, double articulated, three car-body sections, and three trucks. The center section of each vehicle generates propulsion and auxiliary power; each end section accommodates passengers. Each vehicle has two cabs and four large doors (two per each end section). The consortium designed them based on similar GTW/2/6 vehicles (articulated power cars with six axles, two driven) built for European commuter and main line trains. NJ Transit asked them to adapt the vehicles for its own needs: high crash standards, a smaller track curve radius, and a higher passenger comfort level.

Mr. Canjea presented basic technical data in terms of length, weight, capacity, etc., and went on to discuss propulsion methods. The vehicles have diesel engines that produce 625 horsepower propulsion and maximum output power (at 2100 rpm) of 750 horsepower. They also have traction generator units that are direct-coupled with the diesel engines. An intermediate link provides a three-phase AC current to two motors to assist the braking resistors and boost the auxiliary power supply. The drive units consist of two traction motors directly coupled with the gear; the transmission has parallel gears with a ratio of 6.667:1.

Braking features include an electro-dynamic system used as the primary service brake; they dissipate the braking energy via the braking resistors. A direct electro-pneumatic friction brake compliments the primary braking mechanism and is also used at low speeds as a service brake. The system includes two disks per axle on the trailer/end trucks, and one disk per axle on the power truck. There are also track brakes—two per truck for a total of six. The vehicles' parking brakes are spring applied; there are four per car, which can hold an AW3 model on a 6 percent grade. The brakes feature slide control and sanding to improve adhesion, and the emergency brake (a push button) operates at 4.5 miles-per-hour-per-second.

NJ Transit, Mr. Canjea explained, wanted to improve the passenger comfort level of the vehicles, and had heating and air conditioning (HVAC) designed and built by HFG-Faiveley. The engine warms the water used to heat the cars, and the system uses refrigerant R134a to cool them. The cabs have two independent and automatic units mounted on the roof; each has a cooling capacity of 3.9 kilowatts. Each vehicle has two independent screw-compressor units for the passenger area—also roof mounted—with a cooling capacity of 2x15.5 kilowatts. In the "C" section of each car, a boiler and oil burner provide additional heat. The HVAC system operates via a digital controller (FPC4R/C). In addition to climate control, the cars improve the quality of ride for passengers by reducing the noise levels inside and outside the cars thanks to good

mufflers and a well-balanced design. The trains have vertical and lateral acceleration levels for 4/2.5 hours.

NJ Transit found that DMU vehicles produce lower levels of engine emissions than other light rail vehicles. Tests show that they produce significantly lower emissions of nitrous oxides, carbon monoxide (CO), hydrocarbons (HC), and particulate matter than the other vehicles available on the market. Mr. Canjea showed the group a chart that made direct comparisons between the vehicles used on the T-REX line in Denver, the River Line's DMUs, and the Hudson-Bergen Line vehicles. Among them, the DMUs are clearly the superior vehicle. NJ Transit worked with Envirosafe (a Pyroban Group company), to investigate ways to burn cleaner diesel and reduce emissions. They recommended adding diesel catalyst, a cost effective solution that helps eliminate CO and HC and reduce particulate matter, and diesel filter (Eminox), which eliminates P10 particles. Envirosafe also suggested installing a continuous regeneration trap (CRT) to extract soot particles and further reduce CO and HC output. NJ Transit also installed Siemens VDO Automotive PCR, another filter system.

Mr. Canjea explained that one of the DMUs' features is dual modes for tunnel operation. The vehicles use diesel propulsion outside, and pantograph or an electrified third rail inside the tunnels. The design is based on one specifically created for Switzerland's tunnels, and NJ Transit found there were significant advantages to using the same basic design.

There are several kinds of DMUs currently on the market, most made by Siemens or Bombardier. Mr. Canjea's presentation included a more detailed comparison of DMUs versus other light rail vehicles.

NJ Transit's preliminary evaluation of the GTW/2/6 vehicles is based on the good results of critical tests performed abroad and on-site, three months of revenue service simulation with the 20-car fleet, one month of actual revenue service, the input of the vehicle maintenance information system, and the constant evaluation of various engineering issues. NJ Transit also performed dynamic tests under the most demanding test conditions to determine performance and ride comfort under stress. All the test results fell within acceptable limits, and NJ Transit is pleased with the results of this project so far.

One member of the group asked Mr. Canjea for the specific cost per vehicle and whether or not that cost included engineering and spare parts. Mr. Canjea replied that the vehicles cost approximately \$3.5 million per unit (less than 10 percent of the value of the project), but that cost does not include engineering and spare parts because the agency bought them on a design-build contract.

This discussion concluded Mr. Canjea's presentation.

[Access to the Region's Core: The Trans-Hudson Express Tunnel](#)

Tom Schultz, NJ Transit, gave an overview presentation of NJ Transit's plans to build another tunnel under the river to connect New Jersey and New York City/Penn Station. Additional information about this project can be seen at www.accesstotheregionscore.com. Mr. Schultz began his presentation by showing a video highlighting the features and benefits of the project.

The Trans-Hudson Express Tunnel, as the project is known, proposed building a new two-track tunnel, a new station facility, and a new rail yard to increase capacity in and out of New York City from New Jersey. NJ Transit conducted a study to determine the best way to increase commuter capacity, and the study revealed that commuter rail lines give the biggest increase for the dollar. In 2004, there is train service into Penn Station every two and one-half minutes, and the station's capacity is strained. Even with capacity improvements, the station will still max out by 2010. Now, any delay cascades into the whole system and causes back-ups from which the rail network cannot recover. The agency is planning to build the new tunnel 140 feet below the surface and add a new rail station to take the load off Penn Station. Additionally, the project supports far west side development in Manhattan, supports the expansion of the Javits convention center, is compatible with the number 7 subway extension, and supports New York's bid for the 2012 Olympics.

The project is planned for two phases. In Phase One, NJ Transit will construct one single track tunnel; make platform, concourse, and train staging improvements at Penn Station (including a pedestrian connection to the Farley Post Office, proposed as the facility for a new station); make new track connections in New Jersey for direct service to the Meadowlands sports complex; and build equipment and rail support facilities. In Phase Two, the agency plans to build the second single track tunnel, create major new platform and track capacity proximate to Penn Station (possibly Farley Post Office), and construct additional equipment and support facilities.

Mr. Schultz told the group that NJ Transit is now in the early stages of EIS, and is organizing agencies from multiple cities and states and numerous community boards to meet its ambitious deadline of a complete draft EIS by mid-2005 and a final EIS by mid-2006. NJ Transit hopes to begin construction on Phase One in late 2007 and begin operations by 2010 (no later than 2012). The agency hopes to have the entire system complete by 2015.

When asked if NJ Transit planned to move all the tracks and platforms to Farley Post Office, Mr. Schultz replied that the post office would only accommodate passenger facilities, not any platforms or track. Another participant asked why NJ Transit plans to build another line into mid-town, and if it has considered more than one corridor to carry traffic from New Jersey to New York to offset the possibility of easy terrorism on the lines. Mr. Schultz said that demand is more immediate to mid-town than to any other area of the city at the moment, and demand is driving these decisions. Asked why the agency plans to build so close to an existing rail station instead of placing major stations

in the north and south ends of the city, Mr. Schultz had to beg newness to the job (he's only been with NJ Transit for three months) as his reason for being unable to answer the question—he didn't know. Finally, a member of the Roundtable observed that core capacity projects in major areas are important and expressed hope that there will eventually be a separate funding arm in FTA to pay for projects of this nature.

These remarks concluded Mr. Schultz's presentation.

Closing Remarks

Mr. Carnaggio thanked the attendees for their participation in the Roundtable and looked forward to hearing from the three task forces at the next meeting. He also extended thanks to NJ Transit for hosting this Roundtable, and finally closed the meeting. There were no issues or action items to be addressed at the next meeting. The location of the next Roundtable is to be determined.